Rate Setting Guidelines
For
Natural Gas Distribution and Supply

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PART 1 PURPOSE, SCOPE, APPLICATION AND REVISION

PURPOSE

The purpose of these guidelines is to set out the principles, methodology and processes for approval of Natural Gas Distribution and Supply tariffs by the Public Utilities Regulatory Commission (PURC). The guidelines aim to provide PURC with the information it needs to make decisions on Natural Gas Distribution and Supply tariff adjustments. Finally, the guidelines provide industry participants with information to facilitate tariff application and approval processes.

SCOPE AND APPLICATION

The guidelines apply to a Public Utility licensed or authorised under any law to own or operate Natural Gas Distribution and Supply assets or to provide natural gas distribution and supply services in the regulated gas market in Ghana.

REVIEW, ADDITIONS AND AMENDMENTS

i. These guidelines revoke all guidelines previously issued by PURC for natural gas distribution and supply utilities.

ii. PURC reserves the right to review or add to the guidelines periodically. Review or addition to the guidelines shall be done in consultation with stakeholders and in accordance with the Act.

iii. Amendments, additions and relaxations to the guidelines may be made only with the approval of the Commission.

ENFORCEABILITY

These Guidelines are issued as an Order of the Commission and are enforceable in accordance with the Public Utilities Regulatory Commission Act, 1997 (Act 538) and Energy Commission Act, 1997 (Act 541).

Approved by the Commission on the……. Day of ………………………… 2020

Signed……………………………………………………… Signed……………………………………………
Chairman, PURC Executive Secretary, PURC

CONTENT AND STRUCTURE OF DOCUMENT

This document issued by the PURC constitutes the approved Rate Setting Guidelines for Natural Gas Distribution and Supply in Ghana. The document is organized as follows:

- Part 1 – This Part sets out the Purpose, Scope, Application and Revision of the Guidelines, Definitions and Equation Parameters.
- Part 2- This Part sets out the Tariff Philosophy of the Rate Setting Guidelines.
- Part 3- This Part deals with Tariff Methodology for Natural Gas Distribution.
- Part 4- This Part deals with Tariff Methodology for Natural Gas Supply.
- Part 5- This Part deals with Tariff Determination Processes of the PURC.

DEFINITIONS

Term	Definition
Bulk Customer	Means a customer that purchases or receives natural gas of an amount or level specified by the Energy Commission for consumption and not for delivery or resale to others.
Customer	Means a person that purchases or receives natural gas for consumption and not for delivery or resale to any other person.
Demand Charge	Means costs which are incurred by Gas Distribution Utility in providing peak load of customer at any given time during the month.
Equity Beta	Means Benchmark Asset Beta as established for global gas distribution utilities under incentive-based regulation. This Benchmark Asset Beta shall be re-levered using Hamada Conversion.
Gas Commodity Cost	Means costs which are directly incurred in purchasing natural gas from the supplier and varies depending upon the amount of natural gas actually consumed by the customer.
Ghana Market Return	Means Ghana's market return data as published by an independent international rating agency (Moody's) or financial market reporting company such as Bloomberg or a similar service.
Ghana Market Risk Premium	Means Ghana's market risk premium data as published by an independent international rating agency (for example Moody's) or financial market reporting company such as Bloomberg or a similar service.
Ghana Country Risk Premium	Means country risk premium data for Ghana as published by an independent international rating agency (for example Moody's) or financial market reporting company such as Bloomberg or a similar service.
Ghana Country Default Spread	Means Ghana's country default spread as published by an independent international rating agency (for example Moody's) or financial market reporting company such as Bloomberg or a similar service.
Hybrid Tariff Methodology	Means a tariff setting approach which combines rate of return regulation and incentive regulation, incorporating rewards, penalties and tests of prudence and efficiency in the determination of costs and the revenue requirement for public utilities including natural gas distribution and supply utilities.
Natural Gas	Includes the hydrocarbon fuels which are gaseous under normal atmospheric conditions and wet gas, dry gas and residue after the extraction of liquid hydrocarbon fuels from wet gas.
Natural Gas Distribution Utility	Means a person granted a distribution licence as a public utility under section 26 of the Energy Commission Act, Act 541, 1997 to operate a distribution system for the distribution of natural gas.
Revenue Requirement	Means the total amount required or needed by the Gas Distribution Utility to meet all costs of operations during a one-year period, which shall be known as "test year".
Risk Free Rate	Means the yield on Ghana Government 5-year Eurobond Debt instrument.

Service Charge	Means a charge intended to recover operational costs of the Natural Gas Distribution Utility pertaining to system operations costs, regulatory costs and customer costs such as the monthly fixed costs of meter reading, billing and collections, which costs are incurred regardless of the amount of natural gas that the customer uses.
Working Capital	Means various regulatory asset base funding requirements (other than utility plant in service) or the amount of funds that the Natural Gas Distribution Utility needs to maintain supply inventories, meet prepayment obligations, and to meet operational cash needs between the time the Gas Distribution Utility renders service and when it collects revenues for those services.
Weighted Average Cost of Capital WACC	Means the rate at which a company is expected to pay on average to all its security holders to finance its assets. In other words, WACC is the average of the cost of equity and debt, weighted by the proportions of equity and debt which an efficiently financed company can be expected to use to fund its activities.

EQUATION PARAMETERS

Allowable Rate of Return	As calculated pursuant to section 3.2.4.2 and 4.1.4.2
Cost of Equity	As calculated pursuant to section 3.2.4.2.1 and 4.1.4.2.1
Cost of Debt	As calculated pursuant to section 3.2.4.4.2 and 4.1.4.2.2
Revenue Requirement	As calculated pursuant to Section 3.2 and 4.1
Return on Regulated Asset Base	As calculated pursuant to 3.2.5 and 4.1.5
Regulatory Working Capital	As calculated pursuant to Section 4.1.7
Regulated Asset Base	As calculated pursuant to Section 3.2.1 and 4.1.1
Total Delivered Natural Gas Costs	As calculated pursuant to Section 4.4
Weighted Average Cost of Capital	As calculated pursuant to Section 3.2.4.2 and 4.1.4.2

Interpretation

These Guidelines shall be interpreted in accordance with the Public Utilities Regulatory Commission Act 1997, (Act 538) and Energy Commission Act 1997, (Act 541).

Capitalized terms used shall have the meanings assigned in the definitions.

Capitalized terms used but not defined shall have the meanings assigned in Act 538 and Act 541 where the context demands.

PART 2 TARIFF PHILOSOPHY

2.1 Preamble

The Government of Ghana (GoG), keen on developing its indigenous hydrocarbon resources to foster economic growth and improve the quality of life of its population, is undertaking major infrastructure investments to establish a viable gas industry.

In exercise of the powers conferred on the Public Utilities Regulatory Commission (PURC) under sections 3(a), (b) and 16 of Act 538, section 23 of Act 541 and regulations thereunder[1], these Rate Setting Guidelines for Natural Gas Distribution and Supply are issued. The Guidelines set out the principles, methodologies and processes by which natural gas distribution and supply tariffs shall be determined and approved by PURC.

2.2 Statutory Provisions

The following provisions of Act 538 specifically require PURC, in preparing guidelines and approving rates, to take into consideration the objectives below:

Relevant Section of Act 538	Objective
16 (3) (a)	Consumer interest
16(3) (b); 3(c)	Investor / Utility interest
16(3)(c)	Assuring reasonable cost of production of the service
16(3)(d)	Assurance of the financial viability of the Public Utility
20(1)	Uniformity of prices throughout the country
20(1)(b)	Best use of natural resources
20(1)(c)	Economic development of the country
20(2)	Different rates for different consumer classes

These guidelines are informed by the above objectives in satisfaction of the statutory requirements, as explained more fully below:

- **Consumer interest**: Assurance of value for money in terms of price, quality and reliability; maintaining an optimum balance between affordability and availability of service; fair apportionment of total cost of supply to various classes of consumers; provision of a minimum level of service (lifeline supply) at an affordable price to a specified category of residential customers; ensuring long term availability of service.

- **Investor/Utility interest**: Allowance for an appropriate rate of return on investments to ensure ability of the Utility company and its investors to recover operational and capital expenditure and earn a reasonable return.

- **Reasonable cost of production**: Examination of the cost of production against agreed key performance indices and efficiency benchmarks to exclude unreasonable or inefficient costs.

- **Financial viability:** Allowance for prudent costs as pass-through costs with provision for reasonable return on investment. This includes prudent power purchase costs and provision of adequate revenue for sustainability of the business.

- **Uniformity of prices and population distribution**: Allowance for a tariff structure which incorporates uniform rates for all customers within a particular category of consumers

[1] LI 1911, 2007, LI 1912, 2007 and LI 1913, 2007

regardless of geographic location, and incorporates different rates for different consumer categories in accordance with cost of service.

- **Economic development of the country**: Allowance for "special rates" for priority consumers whose activities may enhance economic development.

In addition, section 26 of Act 541 provides for the licensing of Natural Gas Distribution and Supply Utilities with the condition that charges for services shall be subject to approval by PURC.

2.3 Principles Underlying the Rate Setting Guidelines

These Guidelines are based on the following general principles.

1. Guaranteed non-discriminatory access to use of Natural Gas Distribution and Supply infrastructure
2. Transparent information, procedures and transactions in Natural Gas Distribution Services
3. Provision of options to consumers/producers/suppliers to buy/sell gas and infrastructure capacity, on a level playing field basis, thereby contributing to competition objective

2.4 Objectives of the Rate Setting Guidelines

These Guidelines are intended to achieve the following objectives.

1. Use tariffs as an economic instrument to ensure efficiency in the utilisation of and management of Natural Gas Interconnected Distribution System (NGIDS).
2. Enhance financial sustainability of the Natural Gas industry.
3. Foster the provision of safe and reliable Natural Gas service at fair tariffs levels.
4. Separate regulated and non-regulated business costs.
5. Create necessary conditions for the attraction of needed capital to the sector, at reasonable costs, for system upgrade and efficient expansion.
6. Encourage efficient utilisation of Natural Gas by each customer class.
7. Ensure transparency and non-discriminatory tariff regime.

PART 3 METHODOLOGY FOR NATURAL GAS DISTRIBUTION TARIFF DETERMINATION

3.1 Hybrid Tariff Methodology

The PURC shall employ a hybrid tariff methodology as defined in these guidelines.

3.2 Annual Revenue Requirement of Natural Gas Distribution Utility

The Annual Revenue Requirement (ARR) of a Natural Gas Distribution Utility shall be determined using the following formula:

ARR (Distn) = DepRAB + RtnRAB + OpEx + CorpTax + VOMC

Where

ARR (Distn)	Is Annual Revenue Requirement (Distribution)
DepRAB	Is Depreciation on Regulated Asset Base calculated in accordance with Section 3.2.3
RtnRAB	Is Return on Regulated Asset Base calculated in accordance with Section 3.2.5
OpEx	Is Operating Expenses calculated in accordance with Section 3.2.6
CorpTax	Is Corporate Taxes calculated in accordance with Section 3.2.7
VOMC	Is Variable Operation and Maintenance Cost in accordance with Section 3.2.8

3.2.1 Value of Regulatory Asset Base (RAB)

The value of regulatory asset base (Distribution) at any particular tariff period shall be determined using the replacement value approach. In other words, inflation-adjusted historical cost of regulated assets less accumulated depreciation for the period under consideration plus net working capital. PURC shall keep a comprehensive and detailed Assets Register with respect to Natural Gas Distribution which shall be assessed regularly The following formula shall be used to determine the value of the regulatory asset base:

RAB = V – d + nwc

Where

V	Is Value of used and usable regulated assets at commencement of tariff period under review
d	Is Accumulated depreciation at commencement of tariff period under review
nwc	Is Net Working Capital

3.2.2 Value of Mid-Year Regulated Asset Base

Where a project for which the Commission has approved Capital Expenditure is completed and commissioned in the course of the Regulatory Year, the value of such Assets shall be treated under the Mid-Year Regulated Asset Base of the Natural Gas Distribution Utility using the following methodology.

$MidYearRAB_t = OpeningRAB_t + 0.5\,(CapEx_t – Depn_t – Disp_t)$

Where

$MidYearRAB_t$	Is Mid-Year Regulated Asset Base in Regulatory Year (t)
$OpeningRAB_t$	Is Opening Regulated Asset Base in Regulatory Year (t)
$CapEx_t$	Is Capital Expenditure Related to Completed Capital Works in Regulatory Year (t)
$Depn_t$	Is Depreciation in Regulatory Year (t)
$Disp_t$	Is Disposition Proceeds in Regulatory Year (t)

3.2.3 Depreciation

Depreciation expense shall be determined in accordance with the International Financial Reporting Standards (IFRS) and calculated on Net Re-valued Fixed Assets which are used and useful in providing gas service. Similar to the annual adjustments to the RAB, annual depreciation expense shall be appropriately adjusted to reflect changes in the Ghana Cedi U.S. Dollar exchange rate.

3.2.4 Gearing and Allowable Rate of Return on Regulated Asset Base

3.2.4.1 Gearing

When calculating the cost of capital, the PURC shall make assumptions on the gearing level of the Natural Gas Distribution Utility. Such assumptions shall be based on optimal level of gearing which an efficient Gas Distribution Utility shall expect or deemed to have, rather than on actual level of gearing of the utility

3.2.4.2 Allowable Rate of Return on Regulated Asset Base

The allowable rate of return shall be set equal to the estimated weighted average cost of capital (WACC). The PURC shall determine the WACC, by calculating the cost of debt and equity and the proportions of debt and equity which should be employed in an efficiently financed Gas Distribution Utility using the following formula.

$$WACC= [\{E/ (D+E)\}*K_e] + [\{D/ (D+E)\}*K_d]$$

Where:

E	Is Equity
D	Is Debt
Ke	Is Cost of Equity Using the Capital Asset Pricing Model (CAPM)
Kd	Is Cost of Debt

3.2.4.2.1 Cost of Equity

The PURC shall adopt the following methodology to determine the Cost of Equity.

$$R_e = Rf+CDS+Beta*(USP)$$

Where:

R_e	Is Required Rate of Return on Equity
Rf	Is Ghana's Risk Free Rate (Ghana Eurobond Rate Coinciding with Multi-Year Major Tariff Review Test Year)
CDS	Is Ghana's Country Default Spread
Beta	Is Global Natural Gas Distribution Utility Asset Beta in relation to US Market Index
USP	Is US Premium

3.2.4.2.1.1 Equity Beta

To determine Equity Beta for purposes of computing Cost of Equity, PURC shall adopt the Methodology stated as follows:

$$\beta_L = \beta_U * [1+(1-T)D/E]$$

Where:

β_L	Is Levered Beta (Equity Beta)[2]
β_U	Is Unlevered Beta (Asset Beta)
T	Is Corporate Tax
D	Is Market Value of Debt

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[2] *Refers to Corporate Entities which have Debt as part of their Capital Structure. The Commission's Benchmark Debt Component in the Capital Structure is 70%. However, where the Cost of Debt is determined by the Commission to be significantly lower than the Average Market Cost of Debt, the Commission may opt for a higher Debt Proportion beyond the 70% in the Capital Structure.*

3.2.4.2.2 Cost of Debt

The PURC shall adopt the following methodologies to determine the Cost of Debt.

3.2.4.2.2.1 Pre-Tax Cost of Debt

$$PrCoD = R_{fUS} + CDS$$

Where:

PrCoD	Is Pre-Tax Cost of Debt
R_{fus}	Is US Risk Free Rate (US Treasury Note Rate Coinciding with Multi-Year Major Tariff Review Test Year)
CDS	Is Ghana's Country Default Spread

3.2.4.2.2.2 Post-Tax Cost of Debt

$$PoCoD = R_{fUS} + CDS * (1-T)$$

Where:

PoCoD	Is Post Tax Cost of Debt
R_{fus}	Is US Risk Free Rate (5-Year US Treasury Note Rate)
CDS	Is Ghana's Country Default Spread (Risk of Default on Debt Obligation)
T	Is Corporate Tax Rate

3.2.5 Return on Regulated Asset Base

The return on Regulatory Asset Base shall be calculated as follows:

$$RtnRAB = RAB * WACC$$

Where:

RtnRAB	Is Return on Regulated Asset Base
RAB	Is Regulated Asset Base calculated pursuant to Section 3.2.1
WACC	Is Weighted Average Cost of Capital calculated pursuant to Section 3.2.4.2

3.2.6 Operation and Maintenance Costs

The Commission shall undertake Operation and Maintenance (O&M) cost efficiency analysis upon receipt of operating cost projections from the Natural Gas Distribution Utility taking into account whether such projected/incurred cost is prudent and efficient. In addition, revenue expenditure in respect of newly commissioned projects approved by the Commission shall be recognised in determining the Total Operation and Maintenance Expenses for the Natural Gas Distribution Utility as per the following methodology.

$$O\&M_{t+1} = O\&M_t + (O\&M_t * \alpha) + (VNCA * \mu)$$

Where:

$O\&M_{t+1}$	Is Forecast Operation and Maintenance Expenses of Natural Gas Distribution Utility
$O\&M_t$	Is Base Year Operation and Maintenance Expenses of Natural Gas Distribution Utility
α	Is Projected Average Inflation Defined as $\mathbf{(CPI_{t+1} - CPI_t)/CPI_t}$[3]
VNCA	Is Value of Newly Commissioned Assets
μ	Is Percentage of Value of Newly Commissioned Distribution Assets dedicated to Operation and Maintenance Expenses as Approved by the Commission

[3] CPI_{t+1} is Defined as Projected US Average Consumer Price Index for the Next Quarter; CPI_t is Defined as Base US Average Consumer Price Index

3.2.7 Corporate Tax

Corporate Tax, if any, shall be treated as an expense in accordance with the provisions of Applicable Tax Laws and included in determination of Annual Revenue Requirement (Distribution).

3.2.8 Variable Operation and Maintenance Costs

The Commission shall undertake Variable Operation and Maintenance Cost (VOMC) upon receipt of such cost projections from the Gas Distribution Utility taking into account whether the projected VOMC is prudent and efficient.

3.3 Recovery/Allocation of Revenue Requirement

Having determined the Total Revenue Requirement of the Natural Gas Distribution Utility, the Commission shall recover same through either of the following Tariff Structures. It must however be stated that tariffs recovered under either of the two Tariff Structures are average tariffs.

3.3.1 Two-part Tariff Structure

The two-part tariff structure which is based on Interruptible Gas Distribution Capacity Purchase and Sale Agreement shall consist of Commodity Usage Charge (volumetric or energy content) and a Service Charge both of which are intended to recover Total Distribution Revenue Requirement. It shall be determined as Total Gas Distribution Revenue Requirement divided by Total Projected Gas Volume to be distributed and a Service Charge unrelated to Projected Gas Distribution Volume as determined by the Commission as fixed amount per customer per month.

3.3.1.1 Commodity Usage Charge (Volumetric or Energy Content)

Commodity Usage Charge (USD/MMBtu) is determined as follows.

$CUC_t \quad = TGDRR_t/TPGDV_t$

Where

CUC_t Is Commodity Usage Charge in USD/MMBtu

$TGDRR_t$ Is Total Gas Distribution Revenue Requirement in Million USD

$TPGDV_t$ Is Total Projected Gas Distribution Volume in MMBtu

3.3.1.2 Service Charge

The Service Charge shall be determined on the basis of Natural Gas Distribution Utility monthly fixed costs such as meter reading, billing and collection and total number of customers.

$SC_t \quad = TFC_t/TC_t$

Where

SC_t Is Service Charge in USD/MMBtu

TFC_t Is Total Fixed Cost in Million USD

TC_t Is Total Number of Customers in MMBtu

3.3.2 Three-part Tariff Structure

The three-part tariff structure which is based on Non-Interruptible Gas Distribution Capacity Purchase and Sale Agreement consists of a Demand Charge (Capacity Reservation Charge), a Commodity Usage Charge (volumetric or energy content) and a Service Charge. These charges are intended to recover Total Distribution Revenue Requirement. It shall be determined as the Total Distribution Revenue Requirement divided by Projected Gas Volume to be distributed and a Service Charge unrelated to Projected Gas Distribution Volume as determined by the Commission as fixed amount per customer per month as captured in the following formulae.

3.3.2.1 Demand Charge (Capacity Reservation Charge)

Demand Charge or Capacity Reservation Charge (USD/MMBtu) is computed as follows.

$DC/CRC_t = TGDCRR_t/TCMGD_t$

Where

DC/CRC_t	Is Demand Charge or Capacity Reservation Charge in USD/MMBtu
$TGDCRR_t$	Is Total Gas Distribution Capacity Revenue Requirement in Million USD
$TCMGD_t$	Is Total Contracted Maximum Gas Demand in MMBtu

3.3.2.2 Commodity Usage Charge (Volumetric or Energy Content)

Commodity Usage Charge (USD/MMBtu) is determined as follows.

$CUC_t = TVOMR_t/TPGTV_t$

Where

CUC_t	Is Commodity Usage Charge in USD/MMBtu
$TVOMR_t$	Is Total Variable Operation and Maintenance Revenue in Million USD
$TPGTV_t$	Is Total Projected Gas Distribution Volume in MMBtu

3.3.2.3 Service Charge

The Service Charge shall be determined on the basis of Gas Distribution Utility monthly fixed costs such as meter reading, billing and collection and total number of customers.

$SC_t = TFC_t/TC_t$

Where

SC_t	Is Service Charge in USD/MMBtu
TFC_t	Is Total Fixed Cost in Million USD
TC_t	Is Total Number of Customers in MMBtu

3.3.3 Periodic Natural Gas Distribution Tariff Adjustment

The Periodic Natural Gas Distribution Tariff Review shall be carried out in accordance with PURC's Quarterly Review of Natural Gas, Electricity and Water Tariffs.

3.4 Natural Gas Distribution Service Charge

The Natural Gas Distribution Service Charge as determined and approved by the PURC shall be passed on to end-users as part of the Total Natural Gas Delivered Cost.

PART 4 METHODOLOGY FOR NATURAL GAS SUPPLY TARIFF DETERMINATION

4.1 Annual Revenue Requirement (Supply)

The Annual Revenue Requirement (ARR) shall be determined using the following formula:

ARR (Supply) = DepRAB + RtnRAB + OpEx +WCA + CorpTax + VOMC

Where

ARR (Supply)	Is Annual Revenue Requirement (Supply)
DepRAB	Is Depreciation on Regulated Asset Base calculated in accordance with Section 4.1.3
RtnRAB	Is Return on Regulated Asset Base calculated in accordance with Section 4.1.5
OpEx	Is Operating Expenses (Supply) calculated in accordance with Section 4.1.6
WCA	Is Working Capital Allowance calculated in accordance with Section 4.1.7
CorpTax	Is Corporate Taxes calculated in accordance with Section 4.1.8
VOMC	Is Variable Operation and Maintenance Cost in accordance with Section 4.1.9

4.1.1 Value of Regulatory Asset Base (RAB)

The value of regulatory asset base (Supply) at any particular tariff period shall be determined using the replacement value approach. In other words, inflation-adjusted historical cost of regulated assets less accumulated depreciation for the period under consideration plus net working capital. PURC shall keep a comprehensive and detailed Assets Register with respect to Natural Gas Supply which shall be assessed regularly. The following formula shall be used to determine the value of the regulatory asset base:

RAB = V – d + nwc

Where

V	Is Value of used and usable regulated assets at commencement of tariff period under review
d	Is Accumulated depreciation at commencement of tariff period under review
nwc	Is Net Working Capital

4.1.2 Value of Mid-Year Regulated Asset Base

Where a project for which the Commission has approved Capital Expenditure is completed and commissioned in the course of the Regulatory Year, the value of such Assets shall be treated under the Mid-Year Regulated Asset Base of the Natural Gas Supply Utility using the following methodology.

$MidYearRAB_t = OpeningRAB_t + 0.5\ (CapEx_t - Depn_t - Disp_t)$

Where

$MidYearRAB_t$	Is Mid-Year Regulated Asset Base in Regulatory Year (t)
$OpeningRAB_t$	Is Opening Regulated Asset Base in Regulatory Year (t)
$CapEx_t$	Is Capital Expenditure Related to Completed Capital Works in Regulatory Year (t)
$Depn_t$	Is Depreciation in Regulatory Year (t)
$Disp_t$	Is Disposition Proceeds in Regulatory Year (t)

4.1.3 Depreciation

Depreciation expense shall be determined in accordance with the International Financial Reporting Standards (IFRS) and calculated on Net Re-valued Fixed Assets which are used and useful in providing gas service. Similar to the annual adjustments to the RAB, annual depreciation expense shall be appropriately adjusted to reflect changes in the Ghana Cedi U.S. Dollar Exchange Rate.

4.1.4 Gearing and Allowable Rate of Return on Regulated Asset Base

4.1.4.1 Gearing

When calculating the cost of capital, the PURC shall make assumptions on the gearing level based on optimal level of gearing other than on actual level of gearing with respect to Gas Supply.

4.1.4.2 Allowable Rate of Return on Regulatory Asset Base

The allowable rate of return shall be set equal to the estimated weighted average cost of capital (WACC). The PURC shall determine the WACC, by calculating the cost of debt and equity and the proportions of debt and equity, which should be employed using the following formula.

$$WACC = [\{E/(D+E)\}*K_e] + [\{D/(D+E)\}*K_d]$$

Where:

E	Is Equity
D	Is Debt
Ke	Is Cost of Equity Using the Capital Asset Pricing Model (CAPM)
Kd	Is Cost of Debt

4.1.4.2.1 Cost of Equity

The PURC shall adopt the following methodology to determine the Cost of Equity.

$$R_e = Rf + CS + Beta*(USP)$$

Where:

R_e	Is Required Rate of Return on Equity
Rf	Is Ghana's Risk Free Rate (Ghana 5-Year Eurobond Rate)
CS	Is Ghana's Country Default Spread
Beta	Is Global Gas Distribution /Supply Utility Asset Beta in relation to US Market Index
USP	Is US Premium

4.1.4.2.1.1 Equity Beta

To determine Equity Beta for purposes of computing Cost of Equity, PURC shall adopt the Methodology stated as follows:

$$\beta_L = \beta_U * [1+(1-T)D/E]$$

Where:

β_L	Is Levered Beta (Equity Beta)[4]
β_U	Is Unlevered Beta (Asset Beta)
T	Is Corporate Tax
D	Is Market Value of Debt
E	Is Market Value of Equity

4.1.4.2.2 Cost of Debt

The PURC shall adopt the following methodologies to determine the Cost of Debt.

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[4] *Refers to Corporate Entities which have Debt as part of their Capital Structure. The Commission's Benchmark Debt Component in the Capital Structure is 70%. However, where the Cost of Debt is determined by the Commission to be significantly lower than the Average Market Cost of Debt, the Commission may opt for a higher Debt Proportion beyond the 70% in the Capital Structure.*

4.1.4.2.2.1 Pre-Tax Cost of Debt

$PrCoD = R_{fUS}+CDS$

Where:

PrCoD	Is Pre-Tax Cost of Debt
R_{fus}	Is US Risk Free Rate (US Treasury Note Rate Coinciding with Multi-Year Major Tariff Review Test Year)
CDS	Is Ghana's Country Default Spread

4.1.4.2.2.2 Post-Tax Cost of Debt

$PoCoD = R_{fUS}+CDS*(1-T)$

Where:

PoCoD	Is Post Tax Cost of Debt
R_{fus}	Is US Risk Free Rate (5-Year US Treasury Note Rate)
CDS	Is Ghana's Country Default Spread (Risk of Default on Debt Obligation)
T	Is Corporate Tax Rate

4.1.5 Return on Regulated Asset Base

The Return on Regulatory Asset Base shall be calculated as follows:

$RtnRAB = RAB* WACC$

Where:

RtnRAB	Is Return on Regulated Asset Base
RAB	Is Regulated Asset Base calculated pursuant to Section 4.1.1
WACC	Is Weighted Average Cost of Capital calculated pursuant to Section 4.1.4.2

4.1.6 Operation and Maintenance Costs

The Commission shall undertake Operation and Maintenance (O&M) cost efficiency analysis upon receipt of operating cost projections from the Natural Gas Supply Utility taking into account whether such projected/incurred cost is prudent and efficient. In addition, revenue expenditure in respect of newly commissioned projects approved by the Commission shall be recognised in determining the Total Operation and Maintenance Expenses for the Natural Gas Supply Utility as per the following methodology.

$O\&M_{t+1} = O\&M_t + (O\&M_t * \alpha) + (VNCA*\mu)$

Where:

$O\&M_{t+1}$	Is Forecast Operation and Maintenance Expenses of Natural Gas Supply Utility
$O\&M_t$	Is Base Year Operation and Maintenance Expenses of Natural Gas Supply Utility
α	Is Projected Average Inflation Defined as $\mathbf{CPI_{t+1}/CPI_t}$[5]
VNCA	Is Value of Newly Commissioned Assets
μ	Is Percentage of Value of Newly Commissioned Assets Dedicated to Operation and Maintenance Expenses

4.1.7 Regulatory Working Capital Allowance

The Working Capital Allowance (Supply) for the Regulatory Year (t) shall be calculated as follows:

$$WCA_t = \frac{(Lag\ (days)_t - Lead\ (days)_t)}{365} * OpEx(Supply)_t * WACC$$

[5] CPI_{t+1} is Defined as Projected US Average Consumer Price Index for the Next Quarter; CPI_t is Defined as Base US Average Consumer Price Index

Where

WCA_t	Is Working Capital Allowance (Supply) calculated for Regulatory Year (t)
Lag Days	Is Average Debtor Days calculated for Regulatory Year (t)
Lead Days	Is Average Creditor Days calculated for Regulatory Year (t)
$OpEx\ (Supply)_t$	Is Sum of Operating Expenses (Supply) calculated for Regulatory Year (t)
WACC	Is Weighted Average Cost of Capital

4.1.8 Corporate Tax

Corporate Tax, if any, shall be treated as an expense in accordance with the provisions of Applicable Tax Laws and included in determination of Annual Revenue Requirement (Supply).

4.1.9 Variable Operation and Maintenance Costs

The Commission shall undertake Variable Operation and Maintenance Cost (VOMC) upon receipt of such cost projections taking into account whether the projected VOMC is prudent and efficient.

4.2 Periodic Gas Supply Tariff Adjustment

The Periodic Natural Gas Supply Tariff Review shall be carried out in accordance with PURC's Quarterly Review of Natural Gas, Electricity and Water Tariffs.

4.3 Natural Gas Purchase Costs

The Natural Gas Purchase Costs shall be treated as a pass-through cost in the Total Natural Gas Delivered Costs to end-users.

4.4 Total Delivered Retail Sale Natural Gas Costs to End-Users

The Total Delivered Retail Sale Natural Gas Costs at the point of Retail Sale (end-users) shall be made up of Gas Commodity Cost, Gas Transmission Service Cost, Gas Distribution Service Cost and Gas Supply/Retail Sale Cost as captured in the following formula.

$$TDGC_{eu} = GCC+GTSC+GDSC+RSC$$

Where:

$TDGC_{eu}$	Is Total Delivered Gas Cost to End Users
GCC	Is Gas Commodity Cost
GTSC	Is Gas Transmission Service Cost
GDSC	Is Gas Distribution Service Cost
RSC	Is Gas Supply/Retail Sale Cost

4.5 Customer Classification and Allocation of Total Delivered Natural Gas Costs

The end-users serviced by the Local Gas Distribution and Supply Utility, for purposes of cost allocation shall be classified as follows:

1. Industrial
2. Commercial
3. Residential

The Total Delivered Natural Gas Costs shall be allocated to above customer classes on the basis of their cost of service structured either as a two-part tariff or three-part tariff structure.

PART 5 TARIFF DETERMINATION/SETTING PROCESS

5.1 Filing Requirements for Major Review

Gas tariffs shall be set at least once in every five years to be effective from the month of January billing cycle.

5.2 Pre-filing Notification

The Natural Gas Distribution/Supply Utility shall file a pre-filing notification with the PURC at least 60 days prior to the intended effective date.

5.3 Filing of Tariff Review Proposal

Within 14 days after serving a pre-filing notification, the Utility shall file its tariff review proposal with PURC in accordance with the PURC Filing Forms. The proposal shall be signed, and each page of the proposal and annexures initialled, by the principal officer of the Utility or authorised representative of the principal officer. The proposal and all required data shall be submitted in one package, notwithstanding the size of the package.

5.4 Preliminary Review

Upon receipt of a tariff proposal, PURC shall review it for compliance with the Filing Forms and information requirements.

5.5 Rejection and Re-filing

PURC shall accept or reject the proposal and notify the Utility of its comments or reasons for rejection. Where a filing is rejected, the Utility shall re-file within a maximum period of fourteen (14) calendar days for consideration by the PURC.

5.6 Publication and Hearings

Where the PURC accepts the filling of the Natural Gas Distribution/Supply Utility, the Commission shall organise "public hearings" to give opportunity to Stakeholders to be heard and comment on the proposals/submissions. Prior to any public hearing, the Natural Gas Distribution/Supply Utility shall publish its tariff proposal/submission in the print media. The publication of the proposed tariffs shall be done at least 14 days before the "public hearings".

5.7 Formal Hearing

Following public hearings, the PURC shall investigate the tariff proposals submitted by the Gas Distribution/Supply Utility. The investigations shall be conducted by staff of the PURC and other experts or representatives of stakeholders.

5.8 PURC decision and Publication of Rates

PURC shall inform the Utility of the tariff decision and cause its decision to be published in the Gazette and the print media.

5.9 Petition for Review of Tariff Review Decision

Upon publication of a PURC tariff decision a Utility may, if aggrieved by the decision, file a petition requesting review of the decision. The petition shall be filed within ten calendar days following the date of publication.

A petition shall be heard in accordance with the PURC Formal Hearing procedures and shall be resolved within 20 working days from its filing, after which all administrative remedies are exhausted.

5.10 Communication

The Utility shall undertake public pre-tariff approval and post-tariff approval communication on key issues relating to gas distribution and supply tariff reviews.

5.10.1 Pre-Tariff Approval Communication

As part of pre-tariff approval communication, the Utility shall engage the public through various media including both electronic and print on issues regarding proposals submitted to the Commission for consideration, and review of tariffs, including reasons and justification for the proposal.

5.10.2 Post-Tariff Approval Communication

As part of a post-tariff approval communication, the Utility shall constantly engage consumers on the level of tariffs granted by the Commission, highlighting key areas where revenues from tariffs approved by the Commission shall be used to address or improve quality of service delivery.